SHOWCASE PROJECT: WINNCOMPANIES: CASTLE SQUARE APARTMENTS

SOLUTION OVERVIEW

Castle Square Apartments, located in Boston's South End, is one of the most critical affordable housing resources in the Boston metro area. As a product of 1960s urban renewal the property looked and performed like many buildings of this era all across the country; built cheaply without giving energy much of a thought. At seven stories tall, its brick and concrete construction provided no insulation in the walls, minimal insulation on the roofs, extensive air leakage between individual apartments as well as to the outdoors.

Before the renovation, residents' two largest complaints were poor ventilation and uncomfortable conditions (either too hot or too cold). The property also had poorly insulated aluminum slider windows and oversized central atmospheric boilers and indirect hot water heaters. Each apartment had an inefficient through-the-wall air conditioner (9.9 EER), and refrigerators and lighting that were last replaced in 1992.

SECTOR TYPE

Multifamily

LOCATION

Boston, Massachusetts

PROJECT SIZE

568,000 Square Feet

SOLUTIONS

Resident engagement for and during the deep energy retrofit at Castle Square Apartments was embraced as the project design goal. Knowing that all apartments had HVAC problems, WinnCompanies underwent a deep energy retrofit as a first step solution to reducing energy loads. A new super-insulated shell (R-40) was designed to wrap the concrete building. This super-insulated shell, combined with an insulated reflective roof (R-40), high efficiency windows (R-5) and extensive air sealing, significantly increased by a factor of ten the insulation value of the building.

The result is a building that requires less than half of the energy previously needed to heat and cool the apartments. Additional energy savings were achieved by using small high efficiency cooling and heating equipment, LED lighting, ENERGY STAR® appliances and solar domestic hot water. An added benefit of the new shell is the visual transformation of the property, bringing the community into the 21st century.

The Deep Energy Retrofit Castle Square scope of work includes:

Super Insulated Shell: (R-40) Exterior super wall insulation utilizing a Kingspan metal panelized system; (R-40) white reflective roof; (R-5) fiberglass casement windows; (R-5) fiberglass French doors; and (R-12) exterior doors on the roof.

Air Sealing: Extensive internal air sealing between apartments and the outdoors, and between apartments.

High Efficiency Boilers and Indirect Hot Water Heaters: 94.5 percent efficiency condensing boilers and indirect hot water storage tanks in four central boiler rooms with hydronic baseboards in apartments.

Solar Hot Water System: Four large solar domestic hot water preheating systems.

Air conditioning: ENERGY STAR air conditioners with a 7800 Btu/hour cooling capacity and a 9.9 EER.

High Efficiency Appliances: ENERGY STAR refrigerators.

Lighting: CFL or LED lighting in hallways, lobbies, kitchens, baths, and exterior walls.

Water Fixtures: .5 gallon per minute (gpm) lavatory aerators, 1.5 gpm kitchen sink aerators, 1.75 gpm showerheads, and flushometers to retrofit existing toilets. If a toilet needs to be replaced, we use a 1.3 gallon per flush toilet.

Ventilation: Renovation of existing exhaust ventilation system utilizing Aeroseal technology and Constant Air Regulator (CAR) Dampers. Installation of fresh air trickle vents.

To learn more about these design strategies and technologies, and Castle Square Apartments, go to www.castledeepenergy.com.

OTHER BENEFITS

As renovations were made to this property, residents were not displaced and continued to live in their apartments. Since the insulation was installed on the outside of the building, hospitality units were only needed for residents to relax in comfort while work was in progress. Additionally, a "How to Guide" published on the Castle Square provides some of the logic behind a deep energy retrofit, how the development team arrived at the final scope of work, and how the solution can be replicated.

Annual Energy Use
(Source EUI)

Baseline(2011)
102 kBtu/sq.ft.

Actual(2014)
65 kBtu/sq.ft.

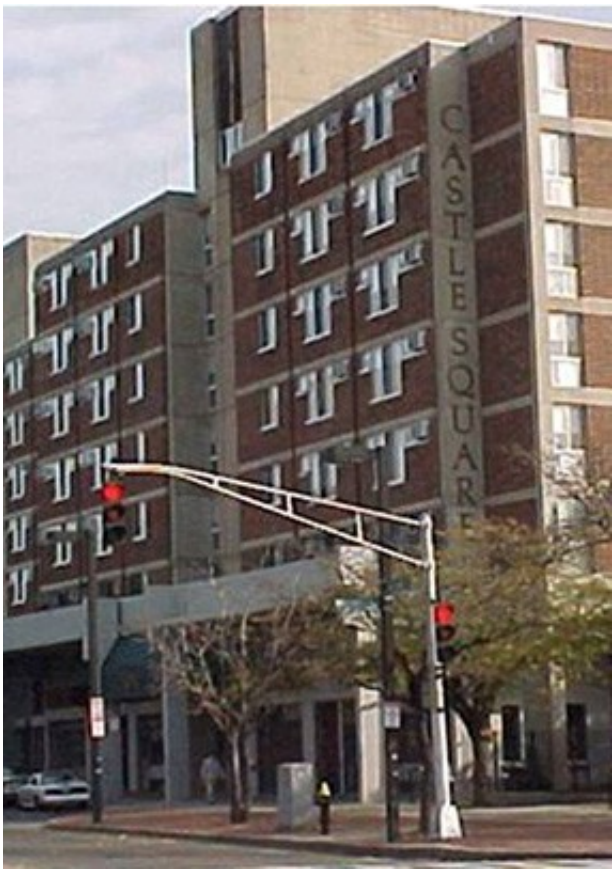
Energy Savings
36%

Annual Energy Cost

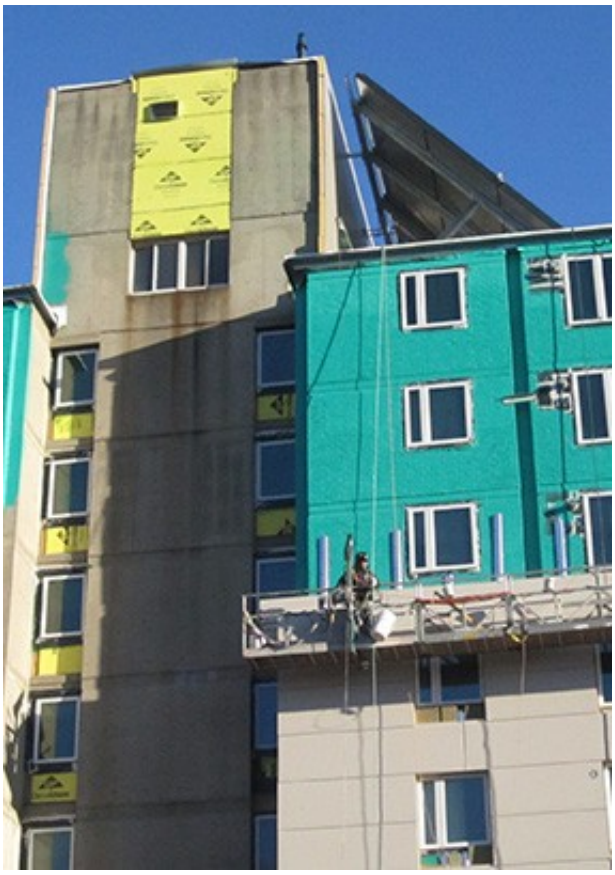
Baseline(2011)
$591,000

Actual(2014)
$378,000

Cost Savings
$213,000



Castle Square prior to the renovation



Applying exterior insulation and cladding

Post renovation with new facade